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Helen A. Odar

Name of Applicant, Assignee or  
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*Helen A. Odar*  
Signature

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**GROUP 3600**

Our Case No. 4865/49-1  
Client Reference No. 1990023A

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Lowell Bok et al.

Serial No.: 09/449,034

Filing Date: November 24, 1999

For: THREE RUN DISK BRAKE STACK  
AND METHOD OF ASSEMBLY

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)  
)  
) Examiner: M. Burch  
)  
) Group Art Unit No.: 3613  
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**BRIEF ON APPEAL**

Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

This is an appeal from the Final Rejection dated September 13, 2002.

This Brief on Appeal is being submitted in triplicate and enclosed is counsel's check in the amount of \$230 for filing this brief.

A personal appearance for presentation of oral argument is requested. The fee will be paid upon receipt of the Examiner's Answer.

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### REAL PARTY IN INTEREST

The real party in interest is the Goodrich Corporation, the assignee of this patent application.

## RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

### STATUS OF CLAIMS

Claims 1-5, 11 and 13-16 stand finally rejected and are on appeal in this case.

### STATUS OF AMENDMENTS

A Response to the Final Office Action was filed on November 13, 2002. The Examiner considered the response but stated that it did not place the application in condition for allowance.

## SUMMARY OF INVENTION

The present invention comprises a three run disk brake stack and method of assembly. (Page 5, lines 20-21). The brake stack includes, in addition to an end plate and a pressure plate, rotors and stators. (Page 5, lines 28-29). The end plate and pressure plate are made of disks respectively having only one wear surface, while the rotors and stators are made of disks having two wear surfaces. (Page 5, lines 29-30). The rotors are interleaved with the stators. (Page 5, line 30- page 6, line 1). The rotors, stators, end plate and pressure plate are made of disks that are of three different sizes: a thick disk, a mid-thickness disk and a thin disk. (Page 6, lines 1-2.) This unique configuration provides for increased longevity of the individual disks of the brake stack, while maintaining the same brake envelope. (Page 6, lines 14-16).

The disk brake stack comprises of disks with available wear portions of a first thickness (the thick disk), a second thickness (mid-thickness disk) and a third thickness (thin disk). (Page 12, lines 2-5). The disk(s) having an initial available wear portion of a first thickness (the thick disk) are of a thickness so that at the first overhaul, the available wear portion of such disks are only partly worn away and the disks are about equal to disks having an initial available wear portion of a second thickness (mid-thickness). (Page 12, lines 6-9). The disks having an initial available wear portion of a second thickness (mid-thickness) at the first overhaul are only partly worn away and such disks are about equal to the disks having an initial available wear portion of a third thickness (thin disk). (Page 12, lines 10-12). The disks initially having an available wear portion of a third thickness (thin disk) at the first overhaul are substantially fully worn and are replaced by new or refurbished disks having an available wear portion of a first, second or third thickness. (Page 12, lines 12-15).

## CONCISE STATEMENT OF THE ISSUES

The specification was improperly objected to as failing to provide antecedent basis for the term "wear faces."

Claims 1-5 were rejected under 35 U.S.C. 112, first paragraph as containing subject matter which was not described in the specification in such a manner to reasonably convey to one skilled in the art that the inventor at the time of the invention has possession of the invention. The Examiner alleges that the specification does not provide for support for the brake disks, end plate and pressure plates each comprising of a disk having three different wear portions.

Claims 1-5, 11 and 13-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Canadian Patent CA-2004091 in view of Bok '895. The issue is whether the claims describe an invention which is not obvious from these two prior art references which lack any motivation to be combined in the manner suggested by the Examiner. Further as part of this rejection, the Examiner modifies the teaching of CA-2004091 in view of itself.



### GROUPING OF THE CLAIMS

For the purposes of this Appeal, the rejected claims do not stand or fall together. Each claim stands or falls alone.

## ARGUMENTS OF APPELLANT

### The Specification Was Improperly Objected To

The specification was objected to as failing to provide proper antecedent basis for the claimed subject matter. Applicants disagree. A description of the “wear faces” can be found on page 11, lines 13-27. Withdrawal of the objection is respectfully requested.

### The Inventors Have Clearly Described Their Invention

Claims 1-5 have been rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention. The Examiner alleges that the specification does not provide support for the brake disks, end plate and pressure plate each comprising of disks with wear faces having three different wear portions. Applicants respectfully submit that such disclosure can be found on page 6 of the specification. In particular, Applicants state: “[t]he rotors, stators, end plate and pressure plate are of three different sizes...” Further mention of the thickness of the end plate and pressure plate can be found on page 12, lines 4-5. Here the applicant has states that “[t]he rotors and stators of the disk brake assembly of the instant invention have three different thicknesses: a first thickness (thick), a second thickness (mid) or a third thickness (thin)...the end plate and pressure plate may have different thicknesses. In addition, the applicants have also described this concept on page 13, lines 26-28. In addition, on page 13, lines 3- line 23, the amount of wear for a particular brake is described. Therefore, Applicants submit that they were in possession of the claimed invention and the rejection is improper. Withdrawal of the rejection is respectfully requested.

Furthermore, the Examiner incorrectly states that the claim language reads as if the end plate, for example is made up of more than one disk and as if the wear faces have three different wear portions. Applicants respectfully disagree. The language of the claims clearly states that the end plate and pressure plate are made of disks respectively which have a wear face which can have one of three different wear portions. This is clearly supported by the claims, the specification (page 6) as well as

the drawings. Therefore, the Applicants submit that the Examiner is incorrect and request withdrawal of the rejection.

#### The Claimed Invention Is Not Obvious

Claims 1-5, 11, and 13-16 have been once again rejected under 35 USC § 103(a) as being unpatentable over Canadian Patent CA-2004091 in view of Bok '895 et al. Applicants respectfully disagree. First, it is not evident that CA-2004091 actually shows disks (including the end plate and pressure plate) of three thicknesses due to three wear portions, where the second thickness disks are two thirds of the thickness of the first disks and the third thickness disks are one third of the thickness of the first disks, despite the Examiner's statement to the contrary. As is evident from the description of the stators on pp. 4-5 of the translation, CA-2004091 does not show explicitly or implicitly, any disk with a three wear portion on a single wear face. Furthermore, CA-2004091 does not provide replacing the fully worn disks with a disk of a first, second or third thickness as claimed by Applicants. Rather, CA-2004091 requires that the worn disk is replaced by new disks having an initial thickness identical to that of the initial disks in the corresponding positions so that the initial arrangement is reproduced. (see page 6 of translation). In addition, there is no description of having a brake assembly where there are three thicknesses of rotors in the assembly itself. Consequently, CA-2004091 fails to disclose Applicants' invention and claimed invention which clearly sets forth that the end plate, pressure plate, rotors and stators are made of disks which are of three different thicknesses.

The addition of Bok does not remedy the deficiencies of CA-2004091. Bok does not teach the use of an end plate and pressure plate having three different thicknesses. Rather Bok teaches a disk brake in which the brake is assembled with the thickness of the available wear portions of a first group of disks being different from the thickness of the available wear portions of a second group of disks. After a predetermined number of brake applications, the first group of disks is replaced by a third group of disks. As described in greater detail in Bok, the disks used as end plate and pressure plate can only be used as such and not in the stack between the end plate and pressure plate. Therefore, after a service run, if the end plate and the pressure plate are fully worn, they must be replaced with another end plate or pressure plate; they cannot be replaced with a disk from the brake stack. Although Bok states that "other modifications may be

provided in which the thicknesses of the available wear portions of the brake disk are varied to obtain the advantages provided by the above described embodiments," nowhere in the '895 reference does Bok describe directly or indirectly, disks having three separate thicknesses. Other than this vague passage that other modifications are possible, there is nothing in Bok that the Examiner can point to or show which describes this concept of a three run disk brake stack as described and claimed by the Applicants.

Consequently, the combination of CA-2004091 with Bok would not render obvious applicants claimed invention where the pressure plate, end plate, stators and rotors are of three different thicknesses. Bok '895 does not teach use of any heat sink stack containing disks of three different wear portion thickness in a given heat sink assembly. Bok '895 only teaches the presence of two different wear portion thicknesses.

Neither CA-200491 nor Bok teach or suggest that the disks or any of them be initially provisioned with material sufficient for three service runs as in the present invention. In addition, one of ordinary skill in the art would not have been motivated to modify the references collectively to arrive at such conclusion. Once again, the Examiner is using pure hindsight and speculation to arrive at her conclusions. Such action is improper.

#### A. The References Are Improperly Combined

The Examiner's combination of references is erroneous. One of ordinary skill in the art would not combine the references as suggested by the Examiner. The Examiner has improperly used the applicant's invention as an instruction book to reconstruct the claimed invention. This is improper as a matter of law.

The Federal Circuit has stated:

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so... The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

There is absolutely no suggestion in either CA-2004091 or Bok to suggest the combination of these references. The Examiner has failed to point to any such

suggestion in these references. Rather the Examiner is using the applicant's specification as a road map to arrive at her improper conclusions.

Furthermore, one of ordinary skill in the art would not combine the teachings of CA-2004091 with Bok as suggested by the Examiner. The brake design itself of the CA-2004091 reference is different from the conventional brake design used in the brake assembly of Bok. The design of CA-200491 utilizes a torque tube with a flared end (4) as clearly shown in FIGS. 1 and 2. Because of this design, there is no end plate or pressure plate having only one wear surface in the configuration as in the Bok reference. When the stators and rotors have arrived at their minimal thickness according to the teaching of CA-2004091, they are moved sideways toward the flared end of the torque tube. The design and operation of the Bok brake is different.

In most aircraft brake designs, as well as that of Bok, neither the pressure plate nor end plate are able to be positioned or used in other than a single location in the brake disk stack; rather the pressure plate and end plate are specially configured to fit their respective complementary parts due to very different functions in the brake stack.

Because of the different design of the brake assembly itself, CA-200491 can only be applied to a brake whose design permits the same disk to be used in the position and function of a pressure plate, center disks (i.e., rotors and stators) and an end plate. Furthermore, the CA-2004091 reference specifically states that the invention provides for a brake with multiple carbon disks in which each series of carbon disks comprises at least one first group of disks close to the maneuvering device having a first thickness and at least one second group of disks far from the maneuvering device having a second thickness less than the first thickness. CA-2004091 then proceeds to describe how the disks used in the first group at the time of the first mounting can thus be used in the second group at the time of the subsequent mounting. This is further reaffirmed on page 5 of CA-2004091 in which it is stated, "[u]nder these circumstances disks S4, S5, R3 and R4 which have arrived at the minimum thickness, are eliminated, and the other disks are moved **sideways** toward the retaining plate 4." (emphasis supplied). The Bok disks in the first group when worn are replaced by new disks, and not moved **sideways** as are the disks of CA-2004091. This is a further reason why one would not combine the teaching of CA-2004091 with the teaching of Bok.

B. Even if Combined, The References  
Do Not Render Appellant's Claims Obvious

Even if the references were combined in the manner suggested by the Examiner, they still would not render obvious the Appellant's invention. The combination of Bok with CA-2004091 would not result in a functional brake stack let alone a brake assembly comprising of an end plate, pressure plate, rotors and stators, each of three different wear thicknesses as claimed by the Applicants.

C. The Examiner Allegedly Relies Upon "Knowledge  
Available To One Of Ordinary Skill In The Art"

Throughout the Office Action, the Examiner repeatedly asserts that it would be obvious to one of ordinary skill to make a particular modification. For example on page 6 of the Office Action, the Examiner states "the modification of the Canadian reference involving the use of plurality of disks would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a means of increasing the total braking capacity of a brake assembly." There is no basis in the references themselves to make such a conclusion in this instance or any other instance that the Examiner makes such unsupported allegations. Furthermore, Applicants submit that the Examiner is not one of ordinary skill in the art, nor has the Examiner defined one of ordinary skill in the art. Consequently, these unsupported allegations should be stricken.

D. A Reference Cannot Modify Itself

The Examiner as part of the rejection has proceeded as one ground to modify CA-2004091 with itself. (See page 4-5 of Office Action of September 13, 2002). The Examiner however has provided no legal support for this new type of obviousness rejection. A reference itself cannot be used as a base reference as well as the modifying reference in an obviousness rejection. If such a rejection is to be maintained, then legal support for such must be provided.

CONCLUSION

Claims 1-5, 11 and 13-16 are patentably distinguished over the combination of Canadian Patent CA-2004091 in view of Bok. This obviousness rejection is improper because there is no motivation to combine the references as suggested by the

Examiner. However, even if combined, the references do not teach Appellant's claimed invention of a three run brake assembly wherein each of the end plate, pressure plate, rotors or stators can be one of three different configurations.

In view of the foregoing discussion, it is respectfully submitted that the § 103 rejection is in error and that the final rejection should be withdrawn. Furthermore Applicants request a notice of allowability and grant of a patent protecting their invention.

## APPENDIX

### Claims on Appeal:

1. (Amended) A brake disk assembly comprising an end plate, a pressure plate and initially brake disks axially aligned and disposed therebetween, wherein said brake disks, end plate and pressure plate, each comprising of disks with wear faces having three different wear portions, whereby disks of a first thickness have an initial wear portion on each wear face, disks of a second thickness have two thirds of said initial wear portion on each wear face of said first thickness disks, and disks of a third thickness have one third of the initial wear portion on each wear face of said first thickness disks, said brake disk assembly including disks having a first, second and third thickness, whereby at an overhaul the available wear portion on each wear face of said first thickness disks is approximately equal to the initial available wear portion on each wear face of said second thickness disks, and the available wear portion on each wear face of said second thickness disks is about equal to the initial available wear portion on each wear face of said third thickness disks and said available wear portion on each wear face of said third thickness disks is substantially fully worn, whereby said third thickness disks are removed and replaced with disks of a first, second or third thickness.

2. A brake disk assembly according to claim 1, wherein all the brake disks of the first thickness, the second thickness and the third thickness are positioned in an envelope space within said disk brake assembly, said brake assembly having an actuator for urging said disks together to provide braking.

3 A brake disk assembly according to claim 1, wherein said brake disks comprise five rotors and four stators interleaved with said rotors.

4. A brake disk assembly according to claim 1, wherein said brake disks comprise three rotors and two stators interleaved with said rotors.

5. A brake disk assembly according to claim 1, wherein said brake disks comprise four rotors and three stators interleaved with said rotors.



11. (Amended) A brake disk assembly comprising an end plate, a pressure plate, three rotors, and two stators interleaved between said rotors, and disposed between said end plate and pressure plate, wherein said pressure plate, end plate, rotors and stators comprise brake disks having wear faces, said brake disks comprising first thickness brake disks each having an initial first available wear portion on each wear face, second thickness brake disks each having an initial available wear portion on each wear face which is two thirds of the available wear portion on each wear face of the first thickness disks, and third thickness brake disks each having an initial available wear portion on each wear face which is one third of the available wear portion on each wear face of said first thickness disks, said brake disk assembly initially including disks of a first, second and third thickness, whereby at an overhaul the available wear portion on each wear face of each first thickness disk is about equal to the initial available wear portion on each wear face of second thickness disks, and the available wear portion on each wear face of disk of said second thickness brake disks is about equal to the initial available wear portion on each wear face of said third thickness disks and said available wear portion on each wear face of third thickness disk is substantially fully worn and said third thickness disks are replaced by disks of a first, second or third thickness.

13. (Amended) A brake disk assembly comprising an end plate, a pressure plate, four rotors, and three stators interleaved between said rotors and disposed between said end plate and pressure plate, wherein said pressure plate, end plate, rotors and stators comprise brake disks having wear faces, said brake disks comprising first thickness brake disks each having an initial first available wear portion on each wear face, second thickness brake disks each having an initial available wear portion on each wear face which is two thirds of the available wear portion on the wear face of the first thickness brake disks, and third thickness brake disks each having an initial available wear portion on each wear face which is one third of the available wear portion on each wear face of disk of said first thickness brake disks, said brake disk assembly initially including disks of a first, second and third thickness, whereby at an overhaul the available wear portion on each wear face of each first thickness brake disks is about equal to the initial available wear portion on each wear face of disk of said second thickness brake disks, and the available wear portion on each wear face of a second thickness brake disk is about equal to the initial available wear portion on each wear

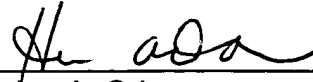
face of said third thickness brake disks and said available wear portion on each wear face of said third thickness disks is substantially fully worn, whereby said third thickness disks are removed and replaced with disks of a first, second or third thickness.

14. A brake disk assembly according to claim 13, wherein the pressure plate and end plate are provided with wear portions of differing thicknesses to maintain a constant overall assembly length at each overhaul.

15. A brake disk assembly according to claim 13, wherein each assembly includes one of a pressure plate and an end plate with a wear portion of about two times the thicknesses of the other one of said pressure plate and said end plate.

16. (Amended) A brake disk assembly comprising an end plate, a pressure plate, five rotors, and four stators interleaved between said rotors and disposed between said end plate and pressure plate, wherein said rotors and stators comprise brake disks having wear faces, said brake disks comprising first thickness brake disks each having an initial first available wear portion on each wear face, second thickness brake disks each having an initial available wear portion on each wear face which is two thirds of the available wear portion on each wear face of the first thickness brake disks, and third thickness brake disks each having an initial available wear portion on each wear face which is one third of the available wear portion on each wear face of said first thickness brake disks, said brake disk assembly initially including disks of a first, second and third thickness whereby after an overhaul the available wear portion on each wear face of said first thickness brake disks is about equal to the initial available wear portion on each wear face of said second thickness brake disks, and the available wear portion on each wear face of each disk of said second thickness brake disks is about equal to the initial available wear portion on each wear face of said third thickness disks and said available wear portion on each wear face of said third thickness disks is substantially fully worn, and said third thickness disks are removed and replaced with disks of a first, second or third thickness.

Respectfully submitted,



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February 3, 2003

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